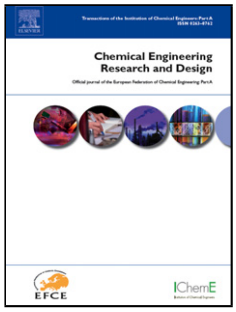

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PII: S0263-8762(17)30415-X
DOI: http://dx.doi.org/doi:10.1016/j.cherd.2017.08.003
Reference: CHERD 2778

To appear in:

Received date: 14-5-2017
Revised date: 11-7-2017
Accepted date: 2-8-2017

Please cite this article as: Wang, Zhe, Han, Fenghui, Sundén, Bengt, Parametric evaluation and performance comparison of a modified CO2 transcritical refrigeration cycle in air-conditioning applications.Chemical Engineering Research and Design http://dx.doi.org/10.1016/j.cherd.2017.08.003

Parametric evaluation and performance comparison of a modified CO_2 transcritical refrigeration cycle in air-conditioning applications

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Highlights

- A modified CO_2 transcritical refrigeration system and an object-oriented modeling are presented.
- Optimal high-pressure correlations of the transcritical CO_2 system are presented.
- The performance and configuration of four systems are analyzed and compared.
- The effect of the IHE and bypass valve on system performance are investigated.

Abstract: Nowadays, the main two issues of heating ventilation and air conditioning (HVAC) are refrigerant alternative and system efficiency improvement. As a safe and environmental protective refrigerant, CO_2 has drawn a lot of attention these years. The improvement on its transcritical cycle efficiency has always been the study hotspot. On the basis of the traditional cycle system, this paper adds the internal heat exchangers (IHE) and pressure control devices into the system and optimizes the CO_2 transcritical system with the dual throttling device. Engineering equation solver is used to build each module in the system as an object-oriented model. The effects of the IHE and bypass valve on system performance are investigated. The performance and configuration of four CO_2 transcritical refrigeration cycles are analyzed and compared. Numerical studies also propose the formula expressing the relationship of the optimum high pressure, the gas-cooler CO_2 outlet temperature and the evaporation temperature under specific operating conditions. In